



# NASA ASTROBIOLOGY INSTITUTE ANNUAL REPORT YEAR [July 2003 - June 2004]

# 6

Annual Reports :: Year 6 :: University of Washington

Project Report: Evolution of biocomplexity from an ancient autotrophic lineage

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## Project Progress

The genome sequence of *Methanococcus maripaludis* is key to studying the evolution of the methanococcal lineage. The genome sequence has been completed and made publically available. A paper on the functional annotation has been submitted. Another goal of the project is to use the genetic tools available for *M. maripaludis*, in concert with the genome sequence, to identify the minimal set of genes that is essential for viability. For this purpose and others, we have devised an efficient method for producing gene deletions in *M. maripaludis*. We have also carried out an analysis of lateral transfer of genes involved in utilization of alanine as a nitrogen source. A paper has been submitted that combines the latter two advances, focusing on the alanine utilization genes for mutagenesis and phylogenetic analysis.

## Highlights

- The genome sequence of *Methanococcus maripaludis*, a mesophilic hydrogenotrophic methanogen, has been completed and is publically available.

## Roadmap Objectives

- **Objective No. 3.2:** Origins and evolution of functional biomolecules
- **Objective No. 3.3:** Origins of energy transduction
- **Objective No. 4.2:** Foundations of complex life
- **Objective No. 5.2:** Co-evolution of microbial communities
- **Objective No. 5.3:** Biochemical adaptation to extreme environments
- **Objective No. 6.1:** Environmental changes and the cycling of elements by the biota, communities, and ecosystems
- **Objective No. 6.2:** Adaptation and evolution of life beyond Earth